

Original article

Is it worth the RRISK? Evaluation of the RRISK (Reduce Risk Increase Student Knowledge) program for adolescents in rural Australia

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Abstract

Purpose: This study evaluates the effectiveness of an intervention targeting adolescent risk-taking associated with drug and alcohol use, driving, and celebrating.

Methods: Pre- and post written surveys were administered in 21 intervention and 19 comparison schools in Northern New South Wales during March 2003 and 2004. The instrument covered knowledge and attitudes associated with self-reported potentially harmful and protective behaviors. Analysis was by multi-level regression.

Results: There were 2705 baseline and 1996 follow-up respondents. Adolescents in the intervention area who attended the Reduce Risk Increase Student Knowledge (RRISK) seminar demonstrated some significant improvements in knowledge, attitudes and behavior compared with those who did not attend, and some significant improvements in knowledge compared with students in comparison schools.

Conclusions: A well-designed one-day seminar that builds on existing curricula, can achieve some significant medium-term benefits in knowledge attitudes and behaviors. © 2006 Society for Adolescent Medicine. All rights reserved.

Keywords:

Harm reduction; Drugs; Alcohol; Driving; Celebrating; Risk-taking

Adolescents and young people are over-represented in injury and trauma figures, including motor vehicle accidents [1]. Thirty-one percent of all motor vehicle accident-related trauma admissions to New South Wales (NSW) hospitals are aged 15–24 years [1]. Young male admission numbers are almost twice as high as young females [1].

Risk-taking behavior is a major contributor to adolescent injury [2,3]. Consequently, risk-taking has become a key concept in injury prevention research [4]. It has long been recognized that adolescents are statistically over-represented in almost every category of risk-taking behavior [5]. It is also clear that risk-taking behavior is highly correlated with injury

in a wide range of contexts, including driving [6], sexually transmitted diseases [7], drug use [8] and crime [9].

Antecedents of risk-taking behavior and resultant trauma are multiple [10] and include developmental factors such as inexperience, poor judgment about negative consequences, an unrealistic sense of competence, control and optimism, a sense of invulnerability [7], and sensation-seeking tendencies [9,11]. They also include socio-environmental factors such as poverty, inadequate transport infrastructure, and availability of necessary hardware (e.g., vehicles, weapons). Other antecedents are high incidence and visibility of risk-taking behavior [12–15]. This provides a strong rationale for workers in education, injury prevention, and health promotion to design communications and interventions specific to particular contexts and target groups.

There is some evidence that skill-based harm minimization prevention, using interactive education strategies in schools, can have a significant effect on adolescent alcohol

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use, other risk-taking behaviors and associated harm [16,17]. However, it is unclear whether these changes are sustained [17].

This article evaluates one such program—Reduce Risk Increase Student Knowledge (RRISK)—in terms of its effect on students' knowledge, attitudes and behaviors regarding alcohol and drug use, driving and celebrating. The research question for this study was: can a well-designed, seminar-based intervention produce significant improvements in knowledge, attitudes and behaviors related to risk-taking? If yes, in what areas have improvements been achieved and what is the magnitude of these improvements?

Methods

Description of intervention—the RRISK program

RRISK aims to give students skills to make informed decisions about risk-taking associated with drug and alcohol use, driving and celebrating. The RRISK program is a combination of a well-designed and multi-strategic seminar day, preceded and followed by complementary in-school activities. Although the seminar component is applied consistently across schools, the in-school activities are not prescribed, and each school decides if and how to implement these activities (e.g., inviting guest speakers into the school, establishing peer education and support systems, engaging parents and community members in projects targeting adolescent risk-taking, holding art or cultural events that address risk-taking). Initially, the RRISK committee planned to add lesson plans, which address risk-taking in different curriculum areas, to the growing pool of possible in-school activities. This had not eventuated by the time the evaluation was conducted. The student surveys therefore effectively evaluated changes following attendance at the one-day seminars and exposure to other activities related to them (e.g., local media coverage and the local public radio station web-site regarding RRISK).

The program is managed by an inter-sectoral committee comprised of representatives from the education sector (Government and Catholic), the health sector (Health Promotion Unit), and local government (Road Safety Officers). It is also supported by Police, Ambulance, and State Emergency Services, Southern Cross University, the local ABC Radio station, and the Department of Public Prosecution. The committee has refined the program content over the last 5 years, focusing primarily on the annual seminars, as well as on resources for in-school activities.

The series of one-day seminars are held in two regional centers with over 1500 students from 26 high schools attending in 2004. The seminars employ varied interactive educational strategies and cover a number of topics. These include the latest research on adolescent risk-taking and drug and alcohol use, safe driving, how to buy and maintain a safe vehicle, a simulated crash scenario, which is a re-

enactment of young people making ill-informed and risky decisions that result in a motor vehicle crash, and 'My Story'—a moving presentation by a young man who has been permanently injured as a result of a motor vehicle accident involving his use of alcohol and drugs.

A major component of RRISK is the peer facilitator initiative. Over 150 students from participating schools are trained prior to the seminars and then facilitate small groups where issues surrounding risk-taking behavior and caring for friends are workshopped.

As well as the student evaluation described in this article, other evaluation components were: 1) a survey of school and teacher involvement in risk-related education, 2) an evaluation of the RRISK inter-sectoral partnership, 3) on-going seminar process evaluations, and 4) a two-year follow-up of road-related infringement and injury outcomes.

Design, setting and subjects

Pre-/post-intervention cross-sectional surveys were conducted in March 2003 and 2004. The study population was students in years 10–12 (years 10 and 11 in 2003 and 11 and 12 in 2004) in 21 intervention and 19 comparison high schools in coastal Northern NSW Australia. These schools comprise around 90% of high schools in the area. Comparison schools were from the southern part of the area where the RRISK program has not been implemented, but where other activities and programs were routinely conducted.

The survey was completed by students who: 1) were present on the day of the survey, 2) were in classes that were surveyed in 2003, and 3) had provided their teacher with written parental consent. Once students arrived at the venue, trained survey administrators interacted with students following a standardized protocol. The survey protocols and instrument were approved by the Ethics Committees of both the Area Health Service and the Department of Education.

Survey instrument

The 20-minute questionnaire items were drawn or adapted, where possible, from validated or recognized instruments [11,18–20]. Demographic variables included school year, age, gender, weekly available spending money, and driver license status.

Knowledge was tested by asking the following open questions: 1) "How can you assess if someone has been drinking too much to drive safely?", 2) "What can you do before a party to ensure you get home safely?", and 3) "What aspects would you check in a second hand car to make sure it was a safe vehicle to buy?" For each of these questions respondents were asked to list as many different answers as they thought would apply. A sample of completed surveys was analyzed inductively to create a list of valid answers and valid answer categories for these questions (e.g., 'air pressure' and 'tread' are both valid answers

Table 1
Protective and harmful celebrating behaviour items

Protective	Harmful
Agreed with a friend to look after each other.	Ended up with no safe way home from the party.
Told a parent or guardian where I was going.	Got so drunk I felt ill.
Had a way my parents or guardian could contact me.	Drove under the influence of either alcohol or drugs.
Planned a safe way home, prior to the party.	Was a car or bike passenger with a driver I suspected was influenced by alcohol or drugs.
Called a parent, friend, carer or relative to collect me.	Smoked marijuana.
Took a taxi home.	Felt ill from using drugs.
Caught a bus home.	

under the answer category of ‘tires’). The decision regarding the validity of answers and categories was made by experts in the relevant field (e.g., Road and Traffic Authority Officers regarding safety features of a used car). This inductive process was conducted until data saturation was reached and no new categories were emerging [21]. This was reached after analyzing 200 survey forms selected from five intervention and five comparison schools. For subsequent analysis, each answer was scored correct/incorrect. Final analyses were based on the number of correct answers, identified by each respondent, and the number of correct categories that were referred to by one or more of these answers.

Students’ perceived understanding of risk-taking issues, their attitudes and agreement levels concerning risk-taking behaviors were measured by Likert scales. After collecting baseline data, the reliability of these scales was measured by calculating Cronbach alpha.

Two other sets of behavioral outcomes were explored:

1. Self-reported frequencies, during January and February preceding the survey, of:

- heavy episodic drinking sessions (six or more standard drinks on one occasion).
- being a passenger of an alcohol-impaired family member,
- being a passenger of an alcohol-impaired acquaintance,
- driving while alcohol-impaired,
- being a car occupant traveling without using a seatbelt, and
- being a passenger of a drug-impaired driver (drugs other than alcohol).

2. Protective and harmful celebrating behaviors measured via a set of seven ‘protective’ items and another of six ‘harmful’ items (Table 1). These items established the proportion of parties attended during January and February 2003 and 2004 for which respondents reported a particular behavior.

The sets of protective and harmful party behaviors matched the RRISK Program objectives and were consistent with risk-taking topics covered by the NSW Board of Stud-

ies Personal Development, Health & Physical Education curriculum. They were also consistent with Students’ feedback from previous years’ process evaluation, regarding partying behaviors in which they engaged.

The draft instrument was piloted with 20 students and modified accordingly. Factor analysis (principal axis, oblique rotation) regarding the partying behavior questions was conducted after baseline data were collected. Cronbach alpha correlation testing was then conducted on the factors.

Analysis

Multi-level regression modeling (schools, and students in schools) was performed using MLwiN software [22] to apply the following models: normal models (identity link) for common protective behaviors; logistic models (logit link function for categorical responses) for alcohol-impaired driving, riding with alcohol- and drug-impaired drivers, all harmful party behaviors and rare protective party behaviors; and a negative binomial model (log link function) for heavy episodic drinking (HED) and nonuse of seatbelts [22–25].

At baseline/pre there were two groups: 1) intervention area and 2) comparison area. At follow-up/post there were three groups: 1) intervention area who had attended the RRISK seminar, 2) intervention area who had not attended (as identified by a question regarding attendance or otherwise), and 3) comparison area. In order to separate the effects of the two area contexts from the added effect of attendance at a RRISK seminar, treatment dummy variables were created to reflect each of these five groups (Table 2).

Table 2
Groups used in analysis

Group 1	Respondents from comparison schools at pre
Group 2	Respondents from comparison schools at post
Group 3	Respondents from intervention schools at pre
Group 4	Respondents from intervention schools at post who had not attended a seminar
Group 5	Respondents from intervention schools at post who had attended a seminar

These variables were then used as the key predictors in a separate model for each outcome variable (knowledge, at-

titude and behavior questions). Model estimates were used to determine the pre/post effect of being:

- Schooled in the comparison area (group 2–group 1),
- Schooled in the intervention area without attending a seminar (group 4–group 3), and
- Schooled in the intervention area and attending a RRISK seminar (group 5–group 3).

Wald tests were used to compare the differences between pairs of these effects (e.g., net improvement of ‘seminar’ group over the ‘comparison’ group = (group 5–group 3) – (group 2–group 1)). This form of analysis ensured that any baseline differences between groups were taken into account.

The above analyses were conducted for two age cohorts, i.e., ‘Younger’: those aged 15 years at baseline and 16 at follow-up, and ‘Older’: those aged 16 years at baseline and 17 at follow-up. This was done by including age and the interaction of age and group in all models. There were no significant differences between groups in terms of other measured covariates, i.e., gender, income and sensation-seeking. They were consequently excluded from the models. All comparisons were made as adjusted multiple comparison tests.

Results

Descriptive analysis

There were 2705 pre and 1996 post respondents. See Table 3 for full description of the sample characteristics.

At baseline, 23.8% of respondents had some form of driver license, of which 94.5% were learner drivers (learner drivers must drive under supervision for a minimum of 50 hours before they are eligible for a provisional license). At follow-up, 70.4% had a license, of which 67% were learner drivers and 33% had a provisional license. Around 47% and 30% of pre and post respondents, respectively, had \$20 or less to spend per week, and 24% and 38%, respectively, had more than \$60.

Table 3
Sample characteristics

	Pre-2003 (n = 2705)	Post-2004 (n = 1996)
Females	1515 (56%)	1113 (56%)
Males	1185 (44%)	861 (44%)
Comparison students	1461 (63% ^a)	950 (55% ^a)
Younger cohort	871	555
Older cohort	590	390
Intervention students	1245 (65% ^a)	1046 (70% ^a)
Younger cohort	640	265 (seminar)
Older cohort	553	196 (no seminar)
		465 (seminar)
		94 (no seminar)

^a Response rate (adjusted for a reported 25% of students who attended school on the survey day, but were unavailable due to curricula and other demands).

Instrument reliability

Standardized Cronbach alpha for perceived understanding (eight questions) was .68 and for the set of 10 questions, gauging agreement levels concerning risk-taking behaviors, it was .78. Two constructs of protective and harmful partying behavior were confirmed as significant factors (two factors, 39.8% of variance explained, loading range .41–.73). Standardized Cronbach alpha for protective and harmful partying behaviors were .62 and .67, respectively.

Intervention effect on knowledge, attitudes and behaviors

Significant differences are summarized in two formats: 1) Raw scores at pre and post (Table 4) and 2) Relative change, i.e., comparing the pre/post differences of seminar attendees to those of either the comparison group or the nonattendees group (Figure 1 and Table 4).

In both younger and older cohorts, ‘seminar’ respondents had significantly higher levels of knowledge than both ‘comparison’ and ‘no-seminar’ respondents regarding safety features of a used car. In the older cohort, ‘seminar’ respondents had also significantly higher levels of knowledge than ‘comparison’ respondents regarding assessing whether someone is too drunk to drive.

‘Seminar’ respondents in the younger age cohort showed significant improvement in their agreement rate relative to their ‘comparison’ counterparts regarding the statement that ‘everyone who goes to parties should know CPR’. There were also three significant positive improvements in attitude and perceived understanding between the ‘seminar’ and ‘no seminar’ groups’.

In both cohorts, the ‘seminar’ group reported significant improvements in behavior when compared with the ‘no seminar’ group. In the older cohort, the ‘seminar’ group reported a significant improvement regarding planning a safe return from parties compared with the ‘comparison’ group. In the younger cohort, the ‘comparison’ group did significantly better than the ‘seminar’ group on two items related to the protective behavior of ‘looking after friends when partying’.

Discussion

Interpretation of results and choice of comparison group

As in most intervention studies, this study relied on a comparison/control group of schools to isolate the effect of intervention from other effects respondents may have been exposed to. However, data collected in the Teachers Survey component, and anecdotal data from health and education personnel indicate that schools in the comparison area, which do not have a centrally organized event, have engaged in a range of activities addressing risk-taking behaviors. Furthermore, the RRISK Committee originally planned that, by the time the evaluation was conducted, extra in-

Table 4
Summary of significant knowledge attitudes and behavior changes (Standard Error), (↑ = improvement, ↓ = deterioration)

Variable (scoring)	Differences between seminar attendees (in intervention area) and comparison					Differences between seminar attendees and non-attendees (both in intervention area)			
	Comparison at baseline	Comparison at follow-up	Intervention at baseline	Seminar at follow-up	Relative change ^a	Intervention at baseline	No seminar at follow-up	Seminar at follow-up	Relative change ^b
Knowledge									
Younger cohort: 15 years old at pre, 16 years old at post									
Used car safety (n valid answers)	2.64 (.11)	3.14 (.12)	2.73 (.12)	3.77 (.16)	↑ 19%**	2.73 (.12)	3.30 (.20)	3.77 (.16)	↑ 17%*
Used car safety (n answer categories)	2.43 (.09)	2.82 (.10)	2.45 (.10)	3.42 (.13)	↑ 24%***	2.45 (.10)	2.86 (.17)	3.42 (.13)	↑ 23%**
Older cohort: 16 years old at pre, 17 years old at post									
Assessing driver's drunkenness (n valid answers)	3.35 (.12)	3.27 (.13)	3.21 (.13)	3.49 (.13)	↑ 11%*				
Used car safety (n answer categories)	2.88 (.10)	2.95 (.11)	2.98 (.11)	3.46 (.11)	↑ 14%*	2.98 (.11)	2.84 (.25)	3.46 (.11)	↑ 21%*
Attitudes									
Younger cohort									
Everyone who parties should know CPR first aid (1-4)	2.72 (.03)	2.79 (.04)	2.67 (.03)	2.90 (.03)	↑ 6%*				
Older cohort									
Composite score re perceived understanding of risk-related issues (1-32)						24.08 (.27)	23.80 (.48)	24.97 (.28)	↑ 5%*
Agree good parties don't need alcohol or drugs (1-4)						2.69 (.06)	2.39 (.10)	2.60 (.06)	↑ 8%**
Behavior									
Younger cohort									
Agree I only go to a party if a friend goes too (1-4)	3.28 (.03)	3.39 (.04)	3.37 (.03)	3.31 (.05)	↓ -5%				
% parties in which agreed with a friend to look after each other	44.40% (2.45%)	58.27% (2.72%)	57.79% (2.71%)	58.03% (3.46%)	↓ -31%**				
Older cohort									
Agree I don't usually plan a way home before I go to a party (1-4)	1.89 (.05)	1.98 (.06)	2.02 (.05)	1.93 (.05)	↑ -9%**				
Younger cohort									
Agree I always check the driver isn't drunk before I get in the car (1-4)						3.27 (.04)	3.19 (.07)	3.38 (.06)	↑ 6%*
Agree I look out for my friends at parties so they don't get too drunk or stoned (1-4)						3.14 (.04)	3.03 (.07)	3.28 (.06)	↑ 8%***
% parties for which I planned a safe way home before the party						66.35% (4.11%)	65.97% (5.48%)	82.23% (3.86%)	↑ 25%**

Table 4
Continued

Variable (scoring)	Differences between seminar attendees (in intervention area) and comparison					Differences between seminar attendees and non-attendees (both in intervention area)			
	Comparison at baseline	Comparison at follow-up	Intervention at baseline	Seminar at follow-up	Relative change ^a	Intervention at baseline	No seminar at follow-up	Seminar at follow-up	Relative change ^b
Older cohort									
Agree I only go to a party if a friend goes too (1–4)						3.27 (.04)	3.11 (.08)	3.29 (.04)	↑ 6%*
Agree I look out for my friends so they don't get too drunk or stoned (1–4)						3.15 (.04)	2.95 (.08)	3.20 (.04)	↑ 8%**
Agree I always check the driver isn't drunk before I get in a car (1–4)						3.29 (.04)	3.1 (.09)	3.37 (.05)	↑ 8%**
Agree at a party, if I leave my friends for a while, I always tell them where I am going (1–4)						2.95 (.04)	2.75 (.08)	3.04 (.04)	↑ 10%***
% parties where had a way my parents or guardians could contact me						66.66% (4.29%)	79.08% (5.79%)	90.25% (2.55%)	↑ 17%**
% parties for which planned a safe way home before the party						63.11% (4.44%)	49.65% (6.21%)	68.14% (4.22%)	↑ 29%***

^aRelative changes between seminar and comparison results were calculated by using the formula: $((\text{postS-preS})/\text{preS}) - (\text{postC-preC}/\text{preC}) \times 100$.

^bRelative changes between seminar and no-seminar results were calculated by using the formula: $((\text{postS-preS})/\text{preS}) - (\text{postN-preN})/\text{preN}) \times 100$.

* $p < .05$ single test; ** $p < .01$ single test; *** $p < .01$ single test and $p < .05$ for adjusted multiple tests.

Relative % changes in knowledge, attitudes and behaviour between Seminar/Comparison and Seminar/No-Seminar respondents

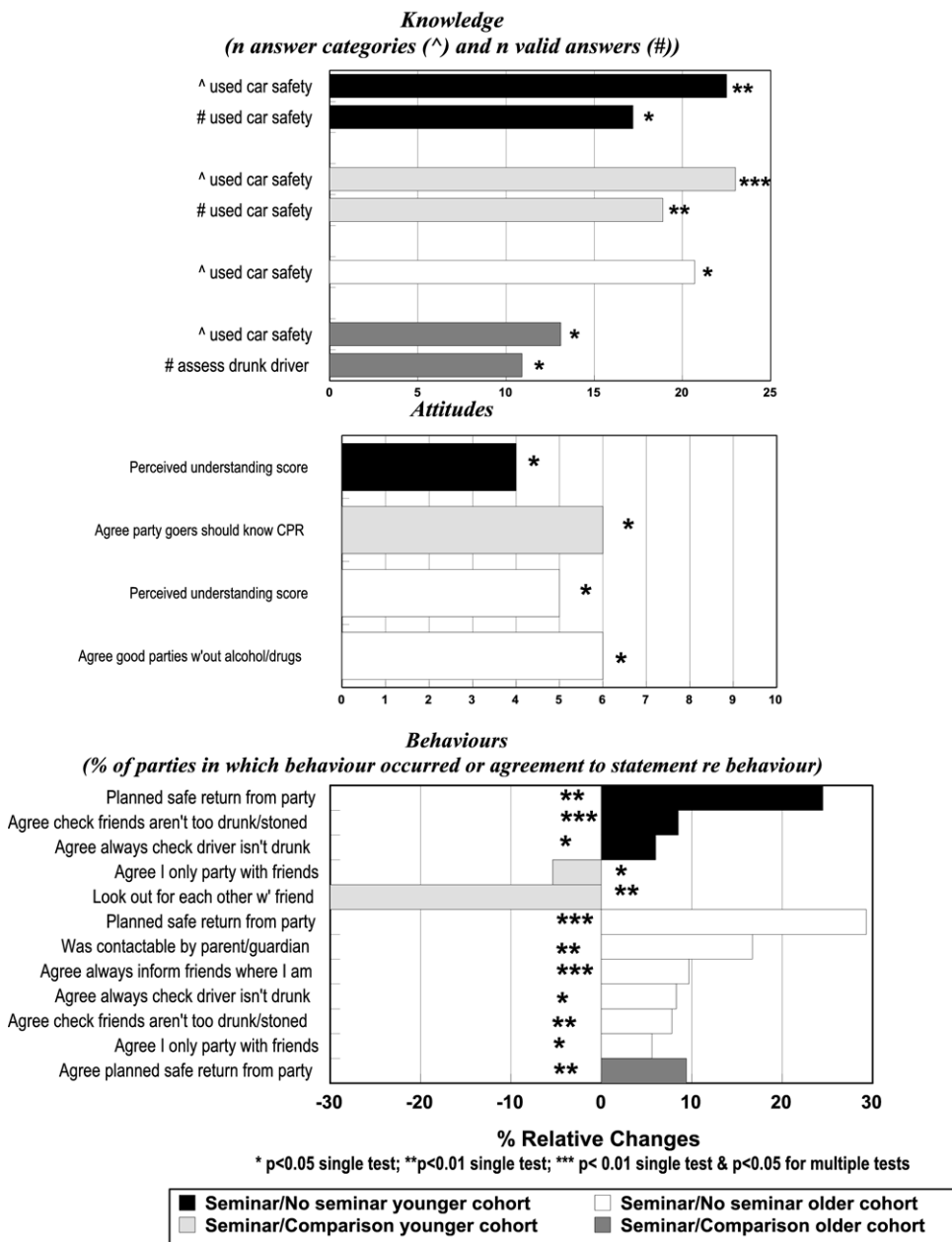


Figure 1. Relative percent changes in knowledge, attitudes and behavior between Seminar/Comparison and Seminar/No-Seminar respondents.

school activities would be available throughout the year to prepare for and build on the seminars. This did not occur. Consequently, there was less potential for differences between intervention and comparison schools than originally thought.

All but two of the 23 significant differences between pre and post changes of the ‘seminar’ group and other groups (‘comparison’ and ‘no seminar’) represent improvements of knowledge attitudes or behaviors in line with the RRISK program objectives. Seminar attendees did better than com-

parison school students regarding knowledge levels in both age cohorts and regarding attitudes and behavior in one age cohort, whereas comparison students did better than seminar attendees regarding two behaviors in one age cohort. These two behaviors concern increasing safety at parties by looking after friends. The relative improvement among students in the comparison group may be due to the ‘looking after friends’ message being reinforced as part of programs that were conducted in some ‘comparison’ schools. The improved knowledge levels displayed by seminar attendees

in the intervention area when compared with both ‘comparison’ and ‘no-seminar’ respondents regarding safety features of a used car, may be a result of the RRISK seminar session lead by a NSW Roads Traffic Authority officer. Although the differences were larger and more significant within the younger cohort, it is encouraging to see that they were still significant within the older cohort of students who have generally been exposed to new information on car safety when acquiring Learner and Provisional licenses.

The most encouraging results of the study were the number of significant improvements between seminar attendees and non-attendees in knowledge, protective attitudes and behaviors. These results isolate the positive effect of the one-day event as seminar attendees and non-attendees have presumably been exposed to the same level of in-school curriculum and other activities related to risk-taking. This assumption was strengthened by finding there were no significant differences between the groups regarding sensation-seeking and other demographic variables. In many ways, the ‘no-seminar’ group was a better control group than the ‘comparison’ group. The results indicate that participation in these seminars had an effect on students’ knowledge, attitudes and behavior beyond the other factors affecting them in school, and that such an effect is likely to be gained in other areas if a comparable one-day program is implemented. The program will have to be similar in its key messages and format to the RRISK seminars, i.e., it should include the latest information on risk-taking in the context of adolescent social life, be interactive, and cater to a variety of learning styles using diverse educational strategies such as drama presentations, personal stories, expert keynote speakers and a peer-led workshop.

The validity of these findings is strengthened by the use of the non-attendees as a control group and by other elements of study design, i.e., the analysis by age cohort adjusted for age differences and the calculation of relative changes between groups took into account the effects of maturation.

The efficacy of the RRISK seminar needs to be considered in terms of its cumulative harm minimization impact for attendees, rather than as isolated changes to individual items of knowledge, attitudes or behaviors. Thus, although some measured changes may be modest when considering individual variables, a number of such modest changes within individuals and/or peer groups may accumulate and contribute to an overall trend/profile of reduction in risk-taking and harm.

Possible effect of seminar participation on other school-based activities

There were substantially more significant differences between seminar attendees and non-attendees than between attendees and comparison schools students. These differences were all in the same positive direction, whereas dif-

ferences between seminar and comparison students went in both expected and unexpected directions. One explanation may be that teachers in some intervention schools thought the seminars would adequately cover risk-taking, thus reducing the need for extra coverage in school. Conversely, comparison schools did not have the benefit of a large-scale annual event such as the RRISK seminar and this could account for a range of other in-school activities that were implemented.

Limitations

Some caution is required in interpreting these findings, as they are subject to limitations typical of all self-report studies, particularly in that respondents’ retrospective accounts may not faithfully reflect events at the time [4,26]. School staff made it clear that in spite of their best efforts, the newly-required active consent process resulted in a reduced response rate simply because it depended upon students taking the form home and returning it to school on time. At follow-up there were smaller samples at the student level due to the general reduction in numbers of enrolled students between year 10 and year 11 (in NSW the end of year 10 is an exit point for some students following completion of the year 10 School Certificate) and also due to organizational factors regarding year 12 timetable (some have free study time and were not present in school on the survey day). However, because the study had a multi-level design, at the school level the same cohort was surveyed (i.e., all intervention and comparison schools were surveyed at both baseline and follow-up).

Within the above limitations, the use of appropriate methodology, validated measures, and sophisticated analytical techniques, has maximized the validity of the findings. Consistency of responses across a range of outcome measures demonstrated a high level of reliability and the large sample size, the number of schools, and similarity in responses across the various survey sites, lend credibility to the findings. Some bias may have been introduced through differential response rates (e.g., gender, intervention/comparison) and it was not possible to ascertain whether non-responders were different in terms of the outcomes of interest. However, checking that there was no difference between the prevalence of potential confounding covariates like gender, income and sensation-seeking [27] among groups, minimized potential bias.

Conclusions and recommendations for improvement of RRISK

Although other studies indicate that one-off education interventions have little positive effect on attitudes and behavior beyond the short term of up to two months [3,17] our study found significant effects five months after the event. However, the RRISK seminar was multi-strategic and dynamic, incorporating many of the factors that have

been identified by recent reviews of effective drug education strategies [28–30].

The seminars were made more memorable by students interacting with students from other schools, and the scale and variety of activities offered, which could not have been conducted in individual schools. Extensive coverage from the local media during the seminar week may have reinforced seminar messages among attendees and their families.

The consistent differences between seminar attendees and nonattendees indicate that increasing student attendance within schools would maximize the impact of the RRISK program in future. Clearly, more in-school activities in support of the curriculum are required to strengthen and supplement the RRISK seminars in order to further improve students' attitudinal and behavioral outcomes.

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